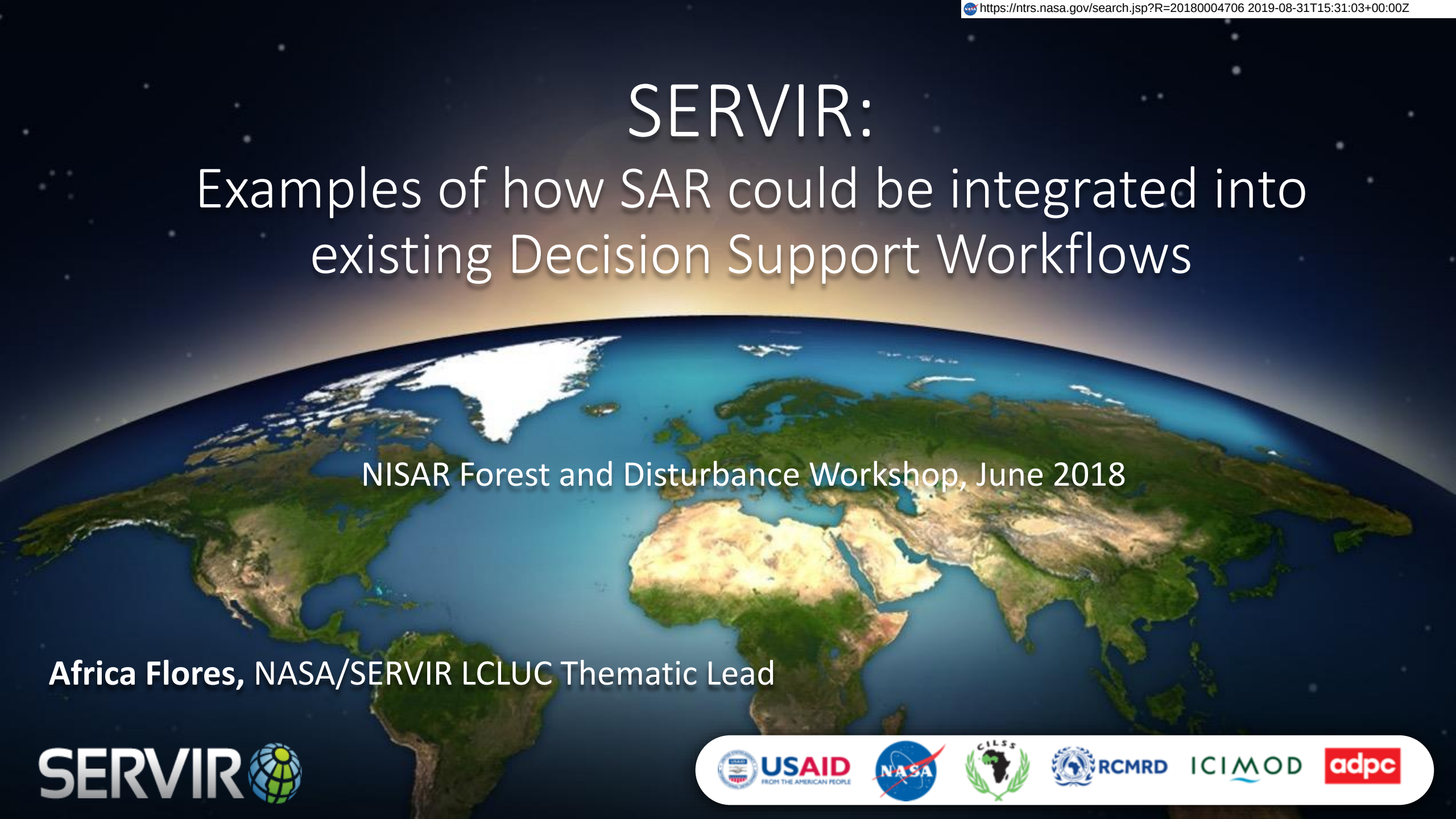
SERVIR:
Examples of how SAR could be integrated into existing Decision Support Workflows



NISAR Forest and Disturbance Workshop, June 2018

Africa Flores, NASA/SERVIR LCLUC Thematic Lead

SERVIR

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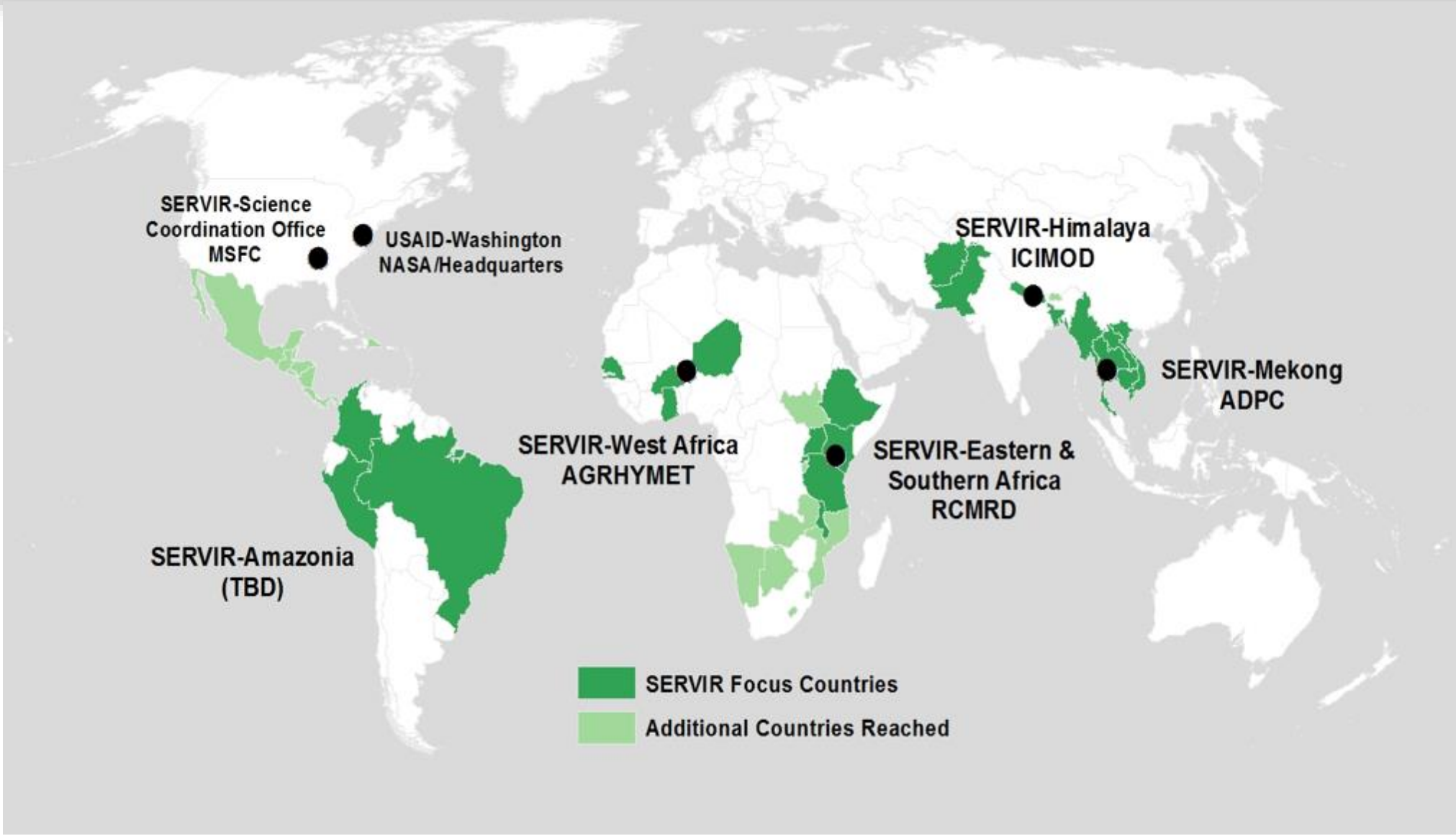

SERVIR is a joint development initiative of NASA and USAID, working in partnership with leading regional organizations around the globe, to help developing countries use information provided by Earth observing satellites and geospatial technologies to address Food Security, Water and Disasters, Weather and Climate, and Land Use/Land Cover Change

Background: Linking Science to End User Needs

- SERVIR is a link between research institutions and end user decision making.
- SERVIR efforts are led by the needs of the region.
- Presence of SERVIR Hubs, such as RCMRD, ICIMOD, ADPC, and AGRHYMET Regional Center, with regional governmental support, makes the linkage sustainable.
- NASA-ROSES selected SERVIR Applied Sciences Team
- Primary direct beneficiaries are national agencies (e.g., ministries, departments)

4

REGIONS

45

COUNTRIES

73

DECISION SUPPORT PRODUCTS

260

INSTITUTIONS

SERVIR

27

COLLABORATIVE SCIENCE ACTIVITIES

400

DECISION-MAKERS & SCIENTISTS

3.5K

PEOPLE TRAINED

2.5M

MAP REQUESTS

Land Cover Land Use Change & Ecosystems portfolio

- **Regional projects** –led directly by SERVIR Hubs
- **Applied Science Team projects** – Co-development with SERVIR Hubs
- **Global activities**: SilvaCarbon collaboration and Collect Earth Online

SERVIR and SilvaCarbon Strengthen Global Capacity on Synthetic Aperture Radar (SAR) Applications for Forest Management

Background

The SERVIR network, including national and regional partners of the Land Cover Land Use Change (LCLUC) community in Africa and Asia have expressed interest on taking advantage of publicly available SAR datasets to enhance measurements of forest biomass. Although the potential of SAR data is well recognized, the current level of experience in the operational use of SAR data for LCLUC applications, (e.g. forest mapping/monitoring, and biomass estimation) is limited. In February of 2017, the SERVIR network and collaborators met in Huntsville, Alabama to identify an approach to address these needs. This led to a series of SAR trainings in Africa and Asia, as well as the development of a handbook on the application of SAR for forest and biomass estimation.

Scoping meeting to identify needs of the international Forest Community

Participation from: USFS, USGS, USAID, SERVIR-Hubs, academia, research institutions and private sector.

Outcomes

<u>Activity 1.</u> Global Round of SAR Capacity Building workshops for international partners in Africa an Asia

Subject Matter Expert (SME)	Training	SERVIR-Hub Hosting training	Location	Dates (2018)
Franz Meyer (Univ. of Alaska Fairbanks) Josef Kellndorfer (Earth BigData)	SAR Basics and Forest Degradation and Deforestation	(1) West Africa (2) HKH	(1)Niamey (2)Kathmandu	(1) Jan 29-Feb 2 (2) Feb 12-16
Paul Siqueira (Univ. of Massachusetts)	Forest height	Mekong	Bangkok	Mar 12-16
Marc Simard (JPL) Hans Andersen (USFS)	Mangrove and Sampling design	E&S Africa	Nairobi	April 16-20
Sassan Saatchi (JPL)	Forest structure and biomass	HKH	Kathmandu	Apr 30 - May 4

<u>Activity 2.</u> SAR Handbook: Methods & guidance book on the application of SAR datasets for **Forest Monitoring and Biomass Estimation**. Publicly available in Fall of 2018. Leading experts on SAR will lead the development of each chapter.

SAR Capacity Building

SAR Applications in Forest Degradation and Deforestation, ICIMOD, Kathmandu, Nepal. February 12, 2018.

SAR Applications in Forest Degradation and Deforestation, AGHRYMET, Niamey, Niger. February 2, 2018.

SAR Capacity Building Feedback

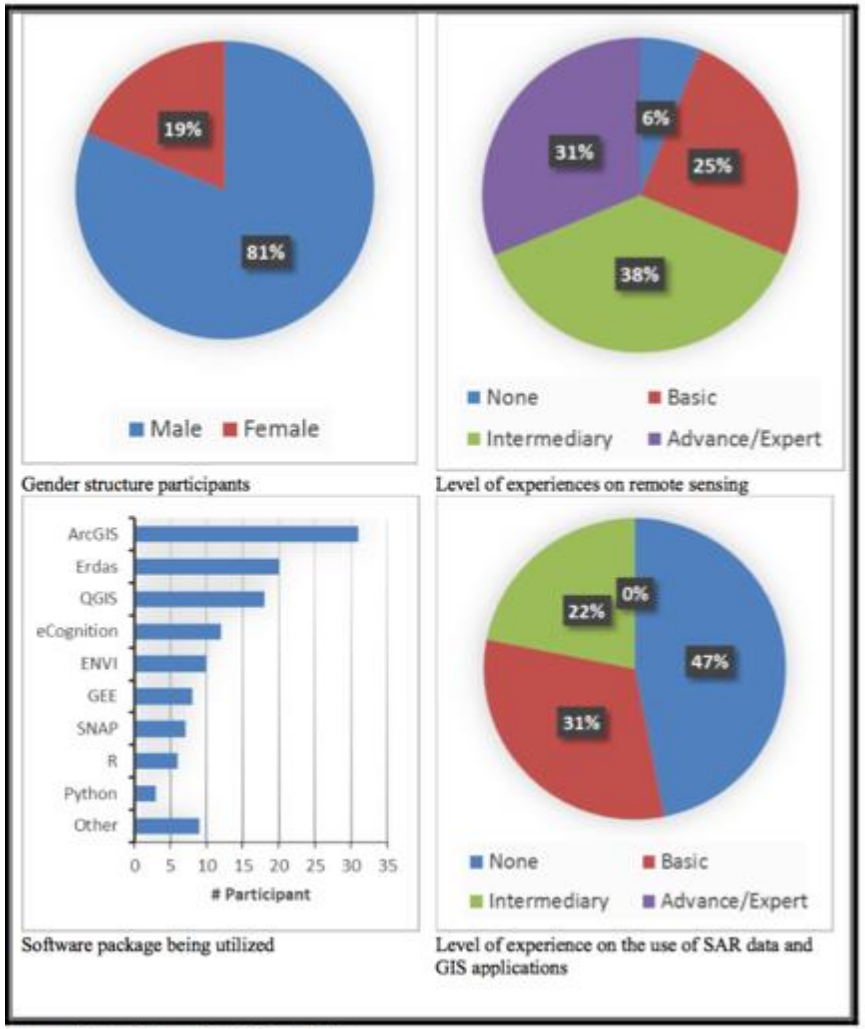

Figure 1. Participants' technical skills

Source: ICIMOD SAR training in Nepal, Feb 2018.

~132 participants in total/ 4 workshops

CB gaps:

-Time series data creation method
-cloud processing for bulk data analysis
-more tutorials and coding to access and process voluminous data
-procedures for data fusion of optical and radar

Applications:

-Automated system for forest degradation identification
-Forest health monitoring
-Deforestation early warning system
-Charcoal monitoring (West Africa)
-Illegal mining

Challenges:

Lack of consistent programing knowledge

100%

Capacity increased because of the training

SERVIR EO data needs/requirements

- **Data and sensor agnostic**

- Freely available data
- Open source software to process data –r, python
- Regular consistent acquisitions – data reliability

Examples of Applications

- **Bangladesh: Wheat mapping**
  - **Sentinel-2 and 1**
  - a decision tree classification using optical satellite images from Sentinel-2 based on crop phenology and
  - supervised classification using synthetic aperture radar (SAR) satellite data from Sentinel-1 using a CART Tree machine learning algorithm were used.
  - GEE environment

- **Vietnam: Rice Mapping**
  - National institute of Agriculture Planning and Projection (NIAPP) in Vietnam

- **Biomass estimation: Enhance MRV systems**

Challenges/Opportunities

-Big data processing – Cloud solutions

Ephemeral water bodies in Senegal (Ferlo region): Low backscatter (C-band, VV polarization) from water and sand.

Colombia:
Sentinel-1 use

- Deforestation early warning system has become the most useful RS-based tool by all environmental sector in Colombia
- Key-issue: “a lot of information” to download, pre-process


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